

7 CARBON SEQUESTRATION MARKETS

Carbon sequestration markets have the potential to increase the level of conservation practice implementation in Idaho, as well as increase ethanol, biodiesel, and bioenergy production. Marketing CO₂ may be similar to what is already occurring with emissions trading of sulfur and nitrous oxide in the Acid Rain Program. Electrical producers and other industries with relatively high greenhouse gas emissions are expecting that in the future, there will come regulations that ‘cap’ their carbon dioxide emissions, possibly some other greenhouse gases as well. There are some energy producers already experimenting with purchasing or leasing carbon ‘credits’ (emission offsets) from farm and forest land activities that increase stored carbon in soils and woody vegetation. Carbon markets in Idaho could provide funding and incentives through a non-regulatory process towards the implementation of practices that have also numerous ancillary benefits, such as increased net profits, lower local unemployment, water quality improvements, and endangered species conservation.

Carbon markets can be a cost-effective way to meet a state or national greenhouse emission goal. The key to keeping costs low is to allow all potential emission reductions or offset practices, particularly those that can achieve these reductions or offsets at low costs. Most evidence points to agriculture and forestry, generally speaking, as being a low-cost provider of carbon sequestration and greenhouse gas reductions (and offsets). The costs of sequestering soil carbon and reducing agricultural CH₄ and N₂O emissions are likely low relative to the costs of emission reductions from fossil fuel combustion.

Carbon markets would require more elaborate baseline information and measurement, monitoring, and verification processes because buyers of greenhouse gas reductions need to document, with confidence, those reductions taking place on agricultural and forested lands. Although there is substantial U.S. experience in point source emissions trading, such as in the acid rain program, there is very limited experience with trading programs that allow trades to take place between point sources and land-based offsets. However, Idaho has some experience in the development of water quality trading, which is likely to be very similar to carbon markets.

The Lower Boise River Pollution Trading Project, which the Soil Conservation Commission played an instrumental part in developing, provides an avenue for a municipality to offset a portion of their waste water phosphorus loads entering the river system. The municipality can fund agricultural conservation practices elsewhere in the river’s catchment, but only by showing that an reduction on the farm is equal to their contribution on-site. Once point sources, these municipalities, are required to meet a new Total Maximum Daily Load (TMDL) mandate, reductions of phosphorus discharges are to begin and trading can occur if necessary. Statewide rules have been generated by the DEQ for water quality pollution trading anywhere in the state. This water quality trading project has set up an excellent process to connect buyers and sellers of phosphorus credits, procedures to estimate and document equal portions of phosphorus within a trade, minimal contract requirements, and trade tracking mechanisms. A carbon market that includes emission sources, agriculture and forest landowners, could be developed very similar to the acid rain cap-and-trade program and the water quality trading program previously described.

There seem to be three important elements missing or yet to occur that would kick-start a carbon market in the U.S. and Idaho. 1) Regulatory CO₂ emission reductions on sources, such as electrical producers, 2) Public acceptance of carbon markets, allowing emission sources to be offsets, and 3) Carbon market and trading rules. Upon regulatory action, likely first by the U.S. Congress and EPA, carbon market development is sure to progress at a much faster pace. Until CO₂ emissions are regulated, then there is little need or demand to offset greenhouse emissions.

7.1 CARBON MARKET AND EMISSION TRADING ACTIVITIES

A number of companies, anticipating the establishment of domestic and international greenhouse gas emissions trading systems, are investing in a variety of emissions trading activities. A recent Pew Center report, "The Emerging International Greenhouse gas Market," estimated that approximately 65 greenhouse gas trades for quantities above 1,000 metric tons of CO₂-equivalent have occurred worldwide since 1996. However, this figure probably underestimates the level of trading because not all trades are made public. Although the United States has withdrawn from the Kyoto Protocol, U.S.-based multinational companies whose overseas operations will be subject to emissions limits in countries that will be party to the Protocol are likely to participate in Kyoto's trading mechanisms.

Some of the carbon market and emission trading activities follow

(see EPA <http://yosemite.epa.gov/oar/globalwarming.nsf/content/index.html> for additional information):

- The Chicago Climate Exchange is based in Chicago and involves seven Midwestern states (Illinois, Indiana, Iowa, Michigan, Minnesota, Ohio, and Wisconsin). The Midwest was chosen as the pilot location because of its 20 percent share of national greenhouse gas emissions and its mix of manufacturing, transport, energy, agriculture, and forestry sectors. Currently, 25 companies are participating, including Agrilience, Alliant Energy, Calpine, Cinergy, DuPont, Ford, GROWMARK, International Paper, NiSource, PG&E National Energy Group, STMicroelectronics, Suncor Energy, Temple -Inland, Wisconsin Energy, and ZAPCO. The project hopes to expand to the rest of the United States and parts of Canada and Mexico by 2003 and internationally by 2004. In this emissions trading program, participating companies are issued tradable emission allowances. Emitting companies commit to a phased reduction schedule of 5 percent below 1999 levels by 2005. To achieve this goal, the companies can use a variety of options. One option is to cut their emissions; another is to buy allowances from companies that have achieved surplus reductions. A third option is to buy credits from agricultural carbon sequestration projects or other offset projects such as sustainable power generation.
- BP launched the world's first global emissions trading system in January 2000. All 150 business units of the company participate in trading. In its first year of operation, 2.7 million metric tons of CO₂ equivalent were exchanged at an average price of \$7.60 per metric ton. The system is now in its third year and includes the former Arco and Vastar assets.
- Cinergy Corp. is working with other industries and organizations to pilot emissions trading systems, and through its subsidiary company United States Energy Bio-gas has completed the trading of carbon equivalent offsets with a Canadian company. Cinergy is in partners in the Rio Bravo Carbon Sequestration Project to protect 65,000 acres of endangered rainforest in Belize. The project combines land acquisition and a sustainable forestry program and is expected to sequester approximately 2.4 million metric tons of carbon over 40 years.
- DuPont is working with others to pilot emissions trading systems and has completed small trades in Canada and the United Kingdom.
- Entergy and Elsam, the largest Danish electricity supplier, executed the first-ever international trade in CO₂ allowances under the Danish climate change program. Under the transaction, Entergy purchased 10,000 Danish allowances from Elsam and will remove the allowances from the market, eliminating 10,000 metric tons of CO₂ emissions.

- Ontario Power Generation (OPG) and PG&E's subsidiary U.S. Gen New England (US Gen) successfully completed a greenhouse gas emissions trade in April 2000. US Gen sold OPG 1 million metric tons of CO₂ equivalent emissions reductions generated by capturing and destroying methane that would otherwise be emitted from the Johnston Landfill in Rhode Island from 1998-2000. OPG has committed to have all of its emissions reduction purchases, such as this one, verified by the Ontario, Canada Pilot Emissions Trading Project (PERT) and report them to Canada's Climate Change Voluntary Challenge and Registry (VCR) Inc., where they are transferred and retired.
- TransAlta has led the development of options, forwards, and other innovative contracts for greenhouse gas emissions reductions and efficient markets. TransAlta develops and trades for approximately 4 million tons of CO₂-equivalent per year in offset projects, with 80 million tons currently under contract. Offset projects incorporate gas recovery, energy efficiency, ruminant methane, landfill and coal mine gas to electricity, forestry, and soil sequestration, among others. In a recent upgrade of its United States operations, the company reduced its CO₂ emissions by an amount equal to the annual emissions of 27,800 cars, and sold the resulting credits to a United States integrated oil company. TransAlta is contributing to the development of liquid markets in greenhouse gas emissions reductions by engaging in selling fractions of its portfolio. To date, sales transactions in excess of 1 million metric tons have been consummated.
- American Electric Power and BP are part of a collaborative greenhouse gas mitigation pilot project with the Government of Bolivia, The Nature Conservancy, and the Bolivian Friends of Nature Foundation. The Noel Kempff Mercado Climate Action Project will protect nearly 4 million acres of threatened forest and offset 5 – 7 million tons of carbon over the next 30 years. AEP is also a partner in the Guaraqueçaba Climate Action Project, which seeks to restore and protect nearly 20,000 acres of partially degraded and/or deforested land in the tropical Atlantic rainforest of Brazil. The Project is expected to offset approximately 1 million metric tons of carbon over the next 40 years.
- Baxter has "adopted" a 150,000-acre rain forest in Costa Rica to help protect biodiversity and promote carbon sequestration. With the support of the Costa Rican government, Baxter performs infrastructure improvements in the rain forest and plans to fund the building of a related education center.
- Wisconsin Energy Corporation participates in a project that involves fuel-switching (coal to natural gas), cogeneration, and efficiency improvements to a power plant in the city of Decin, Czech Republic.
- International Emissions Trading Association (IETA). It proposes to provide an ongoing overview of the status of trading by countries and global companies (see <http://www.ieta.org/>). It is based on the premise that it is in the interest of all involved that an international trading scheme emerge, leading to the lowest overall abatement cost possible. The association is built on the premise that trading will likely be more prominent after the second commitment within the Kyoto Protocol in 2008, but it can also help during the preceding years.
- SGS Société Générale de Surveillance, an inspection, testing, monitoring, and enforcement organization with offices in more than 140 countries. SGS was recently employed by the Costa Rican government to certify the carbon stored in a rainforest area, with the intent that Costa Rica could eventually sell such carbon offsets on the world market (see <http://www.sgsgroup.com/SGSGroup.nsf/pages/costarica.html>).

- Montana Carbon Offset Coalition. The Coalition is a quasi-public entity created with the help of the Montana Legislature. Landowners can receive complete cost sharing to plant trees on land that is not naturally regenerating to trees. In turn, they receive payments to store carbon in the land and the trees. Contracts are signed for upwards of 100 years with the carbon offsets transferred to Montana Watershed, Inc., the private entity associated with the Coalition that actually holds the offsets. The idea is to help corporations mitigate their carbon emissions through purchasing the carbon offsets associated with the now forested land (see <http://www.digisys.net/mwi/Welcome.html> and <http://www.carbonoffset.org/eligible.html>).
- The Chicago-based firm of Environmental Financial Products, LLC is an investment bank and consultancy, who specializes in the design and implementation of market-based environmental protection programs. The Coalition was able to help the Confederated Salish and Kootenai Indian Tribes of northwestern Montana sell carbon offsets to the Sustainable Forestry Management (SFM) group through their London, U.K. office (see http://www.envifi.com/News/sfm_SandK.htm). A total of 47,972 tons of CO₂ equivalent will be sequestered over an 80-year period through reforestation of 250 acres of pineland forest. An investment by SFM will fund the reforestation of the land that was lost to fire. The trade will be monitored by tribal foresters to ensure carbon storage is maintained for a 100-year period. This Chicago firm also proposes to trade in emission (allowances) once this market emerges.
- The Pilot Emission Reduction Trading (PERT) program in Ontario, Canada is an industry-led organization that lays claim to memberships by many businesses and industries, as well as some government agencies and universities. PERT operates as a think tank on issues relating to emissions trading especially in the Windsor-Quebec corridor. It works at suggesting and designing emission (allowance) trading rules that might work. (see <http://www.pert.org/pert.html>)."
- The Greenhouse gas Emission Reduction Trading Pilot (GERT) in Saskatchewan. The GERT Pilot is a "baseline and credit" mechanism, in the main privately operated, in contrast to a "cap and trade" mechanism where government plays a more direct role in setting limits on emissions. A consortium of power companies in Canada has been actively searching for carbon offsets that they might apply against their baseline emissions (see <http://www.gert.org/background/#greenhouse>).
- Carbon banks are also emerging. The International Carbon Bank and Exchange (see <http://www.carbonexchange.com>) "provides a platform that enables individual and corporate clients to keep track of Greenhouse gases in a secure environment." Emission baselines and emission reduction credits (ERCs) can be established and then banked, retired, or made available on the market to consumers or industry.
- The New Jersey Department of Environmental Protection (NJDEP), in collaboration with the Center for Clean Air Policy (CCAP), had received a grant from the USEPA to design a carbon emissions trading, or "banking" system for carbon emissions reductions credits that could operate on a national or international scale. Efforts to develop the design of such a greenhouse gas trading bank focused on the following key elements: 1) methods of recording and certifying credits generated, 2) methods of recording and certifying credits used, 3) methods of recording and tracking credits banked, 4) establishing baselines for credit generation, 5) encouragement of innovative technologies that generate energy with lower greenhouse gas emissions, 6) ensuring

public availability information, 7) ensuring accuracy of all records and transactions, 8) procedures to enforce compliance, and 9) government oversight of operations and quality assurance auditing.

Based on the world-wide carbon market activity, there suggests that there will be greater activity when the Kyoto or something similar officially begins and the U.S. begins to regulate greenhouse gas emission sources. Until then, carbon market development in Idaho will be limited, except through incentives provided by companies to voluntarily initiate further exploration and development of carbon market activity in the state.

7.2 CARBON MARKET PROCESS

There are some possible strategies that Idaho might initiate carbon sequestration activities and specific greenhouse gas reductions. The extent to which Idaho chooses to rely on non-regulatory measures to achieve offset or reduction objectives, including free market transactions, as opposed to regulations, is largely a matter of public policy. While some voluntary action would occur without some new regulations or policies, more interest would be generated by regulations and need. There is an advantage to voluntary action where acceptance may be greater and a higher potential for greater economic efficiency in achieving environmental goals.

At least in the United States, it is likely that a greenhouse gas abatement program would incorporate carbon market mechanisms in conjunction with government setting bounds and helping the market operate in equitable and just ways. It appears that no legal impediments prevent the development of markets for carbon sequestration benefits, where there have been numerous early attempts to acquire carbon sequestration offsets (see above examples). At a minimum there are some structures necessary for a carbon market. First, there must be an effective way to measure or verify the amount of carbon sequestered in the place in question. Second and closely related, there must be a means of enforcing commitments made in private offset contracts short of litigation. Third, there must be a means of minimizing transaction costs. One possibility is to pool individual landholdings for negotiation purposes, such as through aggregators. The pool could be privately operated through an aggregator, organized locally, or, with an appropriate grant of authority, organized through such entities as a Soil Conservation District. Finally, there needs to be some way for future participants of discovering what is a fair market price for a carbon offset representing carbon in storage. Markets price negotiation must be allowed among participants.

The most recent carbon market transaction in Idaho, possibly one of the first in the U.S., is the PNDSA and Entergy agreement. Looking to this market transaction will assist the state and future participants understand some of the processes it takes to create a market. At this point in time, it is difficult to predict the fair market value of such carbon sequestration and offsets. Until the regulatory programs are enacted, the economic value of potential carbon offsets will not be truly be known. Values are a function of company emission reduction costs, carbon measurement techniques (verification), the amount of carbon sequestered (established from a baseline), and cost associated with contract develop among participants.

Carbon markets are likely going to effected by international agreements, rules, and interest. The value of carbon offsets will depend on the cost of achieving the same carbon reduction benefits at any location on the globe. There will likely be at least two kinds of offsets that could be considered in market trading: 1) carbon offsets in flow (COIF) and 2) carbon offsets in stock (COIS). The COIF represents the rate at which carbon might be sequestered in any given year, for example, perhaps something on the order of say 0.2 tons per acre per year, while the latter represents the total amount of carbon sequestered at the site, for example, 70 tons per acre in place in that particular year. While in COIF, it is likely that carbon baselines

will be established to keep a perverse incentive to reduce the stock in place from happening, which then could actually increase the amount of COIF available for purchase in a market. In other words, preventing the removal of a practice previously installed through a carbon market, then re-applied at a later date, to once again receive a carbon incentive payment. Carbon market tracking will have to occur as well to ensure fair market play. The COIS might offer a greater certainty of credits to an interest in need of carbon offsets for a period of time.

Carbon trade might commence and be tracked using certificates, with each certificate representing an amount of carbon stored in a particular acre in that specific year. With the focus on how much is actually stored in place, the incentive will be to maintain the stock, hold onto the carbon and keep it out of the atmosphere.

Focusing on the stock in place (COIS) also points to the reality that eventually a particular place, a certain acre in some site, will be filled to capacity. Once filled to capacity, there needs to be an incentive to maintain it at full capacity. These variables will need to be worked out prior the state wholly engaging in carbon markets.

7.3 CARBON SEQUESTRATION SUPPORTING PROGRAMS

By focusing on the agriculture, forestry, and biofuels sectors, policy-makers can integrate several carbon sequestration and greenhouse gas reduction measures into a single, comprehensive program. The greatest opportunities for reducing greenhouse gas emissions in the agriculture, forestry and biofuels sectors may involve not only direct actions to address each of these sources but also innovative approaches that combine policies so that emission reductions from one source support reductions from others. The carbon market may look favorably to practices that provide dual offsets. For example, methane can realistically be captured from animal waste storage ponds and then be used as an energy source. This decreases direct methane emissions and reduces the need for energy from traditional fossil fuel sources. Another example is eliminating bluegrass burning and utilizing the residue in co-fired energy plants. Reduced nitrogen fertilizer (synthetically produced) can reduce field N₂O emissions as well reduce the amount of fertilizer produced, which lower production related emissions. There needs to be mechanisms and potentially programs that capitalize and encourage dual or multi-benefit emission reduction practices.

Public recognition or other rewards for landowners who increase carbon sequestration and reduce related emissions from more than one source simultaneously may also enhance farmer interest in these activities. Support for demonstration projects or whole-farm case studies in multiple-source emission reductions can also generate farmer interest. A common message about the potential benefits of carbon sequestration and emission reductions from state agricultural agencies, environmental agencies, extension agents, and even in trade journals and other publications can consistently reinforce the fact that landowners can simultaneously sequester carbon, reduce emissions, and enhance net productivity.

7.3.1 Example Comprehensive Programs

There exist numerous state and federal programs and projects that Idaho can look to for example while exploring program development (see EPA <http://yosemite.epa.gov/oar/globalwarming.nsf/content/index.html> for additional information):

- Cool Communities is a voluntary program sponsored by DOE. The function of Cool Communities is to encourage the strategic planting of trees to provide shade and windbreaks to residential and commercial buildings, thereby, improving energy efficiency and reducing the urban heat island effect. These trees also serve as a carbon sink, contributing to the overall carbon

reservoir both above and below ground. (Cool Communities is Action #11 of the CCAP)

- Iowa's Department of Natural Resources provides support, funding, and information to promote switchgrass as a biomass energy crop with the potential for large-scale production across Iowa. In a demonstration project, 35 MW of power will be generated by co-firing coal and switchgrass, displacing coal use and reducing approximately 114,000 tons of CO₂ emissions per year.
- Maryland provides income tax credits for the production and sale of electric power from biomass combustion, including energy crops and poultry litter.
- Wisconsin assists one of its largest dairy farms with manure-to-energy technology that eliminates 26,250 tons of CO₂-equivalent emissions through methane capture and replacement of coal-fueled electric generation.
- The Oregon Forest Resource Trust provides up to 100 percent of reforestation costs to help landowners establish and maintain healthy forests on under-producing forest lands. Landowners forego ownership of any carbon-offset credits to the Trust, but share net revenues from any profitable timber harvest. Net emissions reductions of 1.16 million metric tons of CO₂ are estimated over the life of the program.
- The Vermont Methane Pilot Project promotes the use of methane recovery technology on dairy farms. This method of dealing with livestock waste reduces emissions of a potent greenhouse gas to the atmosphere and displaces fossil fuel energy. In addition, through Vermont's net metering law, farmers that produce up to 125 kilowatt (kW) can sell their excess energy to the grid, providing supplementary income. Methane recovery from dairy manure alone could provide Vermont with 28,000 kW of renewable energy.
- Wyoming recently established an advisory committee to implement a carbon sequestration and carbon credit-marketing program.
- Georgia's No-Tillage Assistance Program leases "no-till" equipment to farmers, providing them with the quickest and most cost-effective method of replanting, and reducing thousands of gallons of fuel use.

7.3.2 Existing Agricultural, Forestry and Biofuels Programs

At present, there are a large number of agricultural conservation programs. Responsibility for implementing these programs is divided between the Natural Resources Conservation Service (NRCS) and the Farm Services Agency (FSA), both agencies of the U.S. Department of Agriculture (USDA). The large number of programs and the numerous eligibility requirements are sometimes barriers to farmer participation. Some major conservation programs are starting to encourage soil carbon storage, CH₄ reductions, N₂O reductions, CO₂ reductions, and water quality benefits. These programs include CRP: Conservation Reserve Program; CREP: Conservation Reserve Enhancement Program; WHIP: Wildlife Habitat Incentive Program; FPP: Farmland Protection Program; EQIP: Environmental Quality Incentive Program. Participation in environmental programs such as the CRP, WRP, and EQIP has been voluntary. These programs provide payments to farmers for adopting conservation practices.

Idaho has its own agricultural programs, such as those administered by the SCC. The Water Quality Program for Agriculture (WQPA), the Resource Conservation and Rangeland Development Program (RCRDP), and the State Revolving Loan Program (SRF) (DEQ administered) are such examples. These

are also conservation oriented, increasing conservation on cropland, rangelands, pasturelands, and some timber lands, enhancing and improving multiple natural resources. These might also consider promoting carbon sequestration practices and linking with industries to secure funding for dual or comprehensive practices that sequester carbon and result in emissions reductions elsewhere.

Tree and timber expansion programs in general may include reforestation (replanting former forests) and afforestation (converting other land uses to trees). Either way, the net amount of carbon dioxide that is sequestered annually by new tree growth varies with the quality of the land, the age of the tree and its species, climate, and other factors. There are programs currently in use to convert idle cropland and pasture into managed forests have shown good results in maintaining a majority of the forest acreage planted, such as the Conservation Reserve Program (CRP) and a program formally known as the Forest Incentives program (FIP), cropland and pasture can be converted to managed forests. The programs involve private landowners, who receive financial and technical assistance, being bound by contract to maintain tree plantings for at least ten years. Millions of acres of trees have been planted since these programs were initiated. The FIP has been quite successful in keeping forested areas from converting back to non-forest uses. Over 90% of the acres planted since 1975 are still in the original plantings. Carbon sequestration benefits from such forested areas, however, may not yet be realized, depending on a future long-term maintenance.

Idaho currently offers a tax deduction for the use of biodiesel and ethanol. Fuel mixtures containing either fuel are eligible. Idaho does not offer a production-based tax incentive program, which may increase its state-wide use (see <http://www.fleets.doe.gov>). The U.S. Internal Revenue Service offers a tax deduction for the purchase of a new original equipment manufacturer (OEM) qualified clean fuel vehicle, or for the conversion of a vehicle to use a clean-burning fuel. The actual deduction depends on the vehicle type(see also <http://www.fleets.doe.gov>).

Most of these programs could enhance carbon sequestration in Idaho. On the flip side, carbon markets could help each of these programs in meeting their objectives. Funding from either carbon markets or programs could leverage additional funds for the other. Most of these federal or state programs require matching funds from other sources. The state could seek avenues to legitimately supplement its own programs with funds generated through carbon markets. Multiple objectives could be reached through a comprehensive and cooperative partnerships among state government, private landowners, and companies.

7.3.3 Demonstration Projects

A demonstration project or projects would be a relatively low-cost way to demonstrate the feasibility of encouraging a large proportion of farmers to adopt carbon sequestration and emission reduction practices. Demonstration projects placed in at least 3 areas of the state and on various farm and forestry situations would provide critical information on how landowners could participate in carbon markets. Other facets would also be made known to enable the state to better understand a carbon market's benefit. Demonstration projects could also serve to test methods for measurement, monitoring, and verification. There exist some actual activities occurring within the state, such as with the PNDSA, that may be utilized to further understand the complexity of carbon markets. There is a need to better understand the economic benefit to a landowner, and to the state, while participating in carbon markets. These demonstration projects may provide the best avenue to accomplish that.

Biofuels production (ethanol and biodiesel) could have a substantial benefit to local economies and state revenue. A demonstration project, a comprehensive economic analysis, that evaluates actual ethanol and biodiesel production in the state, while including a projected increase of production and use, would likely show that it enhances local and state economies. Any state incentives programs that encourage increased

production and use of biofuels should be considered carefully during economic crises, especially during the early stages of biofuels production. When state budgets need to be cut because of low revenue during recession periods, programs are generally cut. A comprehensive economic analysis could show that any cut to state incentive payments of biofuels, might actually reduce state-wide revenue more than what is gained by cutting the incentives. After a time, where biofuels is at or near peak production and use within the state, the incentives payments may no longer be needed.

